peat bogs, but not in the soil conditions necessary for *Thuja*, and *Thuja*, as Professor Fernald well remarks in his article, will grow in habitats either boggy or well drained, but not in the soil conditions, whatever these may be, required by *Pinus Banksiana*. To this extent, then, my observations appear to corroborate the conclusions of Professor Fernald.

URBANA, ILLINOIS.

NOTES FROM THE WOODS HOLE LABORATORY,—1921.

I. F. LEWIS AND W. R. TAYLOR.

(Plate 133)

PLATYMONAS SUBCORDIFORMIS (Wille) Hazen.—In the summer of 1917 a unicellular green organism was found in a small tide pool on Black Rock, near the entrance to New Bedford Harbor. It was considered to be a new American species of the genus *Platymonas* West[1] until Dr. Tracy E. Hazen established and called attention to the fact that it is identical with Wille's *Carteria subcordiformis*.[2] Dr. Hazen's account is reproduced at the end of this note.

The organism has been found in each succeeding summer in the same locality, and Dr. Hazen records its occurrence elsewhere in Massachusetts and in New York, as well as in England and Norway. At the Black Rock station it has been consistently abundant in certain pools. The rock is a haunt of gulls, and the water containing the *Platymonas* is at times so fouled with excrement as to give off a decidedly unpleasant odor. It seems, like certain other Chlamydomonads, to flourish best in the presence of organic pollution. It can endure a range of salinity from that of almost fresh, or quite fresh (Wille), water to that of sea water.

The cells are small, varying in length from 13 to 17 μ, in breadth from 7 to 8 μ, in thickness from 4 to 5 μ. In surface view (pl. 133, figs. 1–3) the cells are oval and flattened. One face is convex, while the other is nearly flat (fig. 4).

The usual vegetative phase is actively motile with the anterior end

[1] West, G. S. Algological notes XVIII–XXIII. Journal of Botany **54**: 1–10. 1916.
[2] Wille, N. Algologische Notizen IX. Ueber eine Art der Gattung *Carteria* Diesing. Nyt. Mag. Naturvid. **41**: 89–94, Taf. 3. 1903.

directed forward. There are four cilia, which are inserted close together in a pit on the anterior end. One lip of the pit is higher than the other. A large stigma occurs in the posterior third of the cell and on its flat face. The chloroplast is single and is usually cup-shaped or sometimes cylindrical. At times it is seen to be two or four lobed anteriorly, but posterior lobes similar to those of *P. tetrathele* West were not observed. The four mammillate anterior projections of the cell of *tetrathele* are also usually lacking, though in cells which have ceased to move the end view may sometimes be quadrate.

The pyrenoid in face view is cup-shaped, though it seems spherical when viewed from the side. Starch grains are found around the pyrenoid and at times elsewhere within the chloroplast. The single nucleus occurs in the cavity of the chloroplast.

The cell wall is a delicate membrane of cellulose, visible with difficulty in the motile cell, though easily observed in fixed material or in reproducing individuals.

Reproduction (figs. 5–19) is exclusively asexual. A vegetative cell loses its cilia and the contents divide into two by constriction. Division may be either longitudinal, oblique, or transverse. The first indication of division is an increase in the size of the cell followed by the splitting of the chloroplast. The stigma then divides unequally, the two parts soon separating. After this the protoplast divides and last the pyrenoid. The peculiar shape of the pyrenoid seems to be due to its mode of division. Fission into equal halves takes place, from which result two shallow cups. The edge of each cup grows upward and inward as if to form a hollow sphere, but the process is incomplete and a deep cup with a narrow opening results.

In its structure and mode of division *Platymonas subcordiformis* shows a remarkably close resemblance to the zoospores of *Prasinocladus subsalsa* (Davis) Wille. The resemblance is so striking as to amount almost to identity. It would be difficult to distinguish between the two if they were mounted in the same drop. The size, the thin membrane-like wall, the four cilia of the same length as the cell, the conspicuous stigma, the plane of division varying from longitudinal to oblique or transverse, the peculiar cup-shaped pyrenoid are all identical. The zoospore of *Prasinocladus* has not been described as flattened, but this point is not easily observed and may have been overlooked as it was when Wille described *Carteria subcordiformis*.

The chloroplast may be either lobed or a continuous cylinder in both forms. Furthermore, bothare catharobic, requiring organic adjuvants to the brackish water in which they live. There are two notable differences. First, *Prasinocladus* has been found only in late fall or winter in this locality, while *Platymonas* has been observed only in summer. Second, *Platymonas* is free swimming, while the cells of *Prasinocladus* are united to form a gelatinous colony.

There is here a problem still to be solved, but to the writer the probabilities strongly favor the view that *Platymonas* is the motile stage, *Prasinocladus* the "Palmella" stage of the same organism.

Opposed to this view is the negative result of culture. *Platymonas* was isolated on agar and kept for over twelve months under continuous observation. Samples were removed and cultivated in sea water under varying conditions. The unicellular condition was persistently maintained and the pseudofilamentous habit of *Prasinocladus* was never assumed. Observations under natural conditions will be required before a final judgment can be given.—I. F. Lewis.

Platymonas **subcordiformis** (Wille) Hazen, comb. nov. *Carteria subcordiformis* Wille, Nyt. Mag. f. Naturvid. **41**: 93, 94. 1903. It may be worth while to record briefly the history of this species. During a visit to Woods Hole in August 1919 Dr. Lewis conducted me to his station for *Platymonas* at Black Rock, where abundant material was secured. Later in the season I found the same species in less amount at Twin Island, Pelham Bay, New York. Early in the summer of 1920, while spending a week at Aalesund, Norway, where Professor Wille had discovered several interesting Chlamydomonads in 1902, I collected a form which was at once recognized as very similar to, if not identical with, that to which Dr. Lewis had introduced me. I was also struck with the resemblance of this form to *Carteria subcordiformis*, especially when comparison was made with the original drawings of the latter a few days later. Upon examination of my freshly collected material, Professor Wille readily identified it with his species, which appears not to have been reported since the original discovery. I later found the same species at Cullercoats, near Newcastle-upon-Tyne, and at Plymouth, England. In September 1920 I again collected the species at Nahant, Mass., and also at Fort Phoenix, Fair Haven, Mass., not far distant from the station on Black Rock, and again at Pelham Bay. I have

had living material from these four stations and from the three European stations for simultaneous examination, and after careful study am convinced that it all belongs to one species. I had hoped to find at Plymouth the type species, *Platymonas tetrathele* West, but I could only discover there *P. subcordiformis* and a new species, quite different from either, which I had also found at Aalesund.

It may appear strange that the compressed form of the cell, which is the chief character upon which this species is to be placed in the genus *Platymonas* rather than in *Carteria*, was overlooked by Wille. But at certain times the narrower diameter of the cells is so little presented to view as to be very inconspicuous. My own first impression was that this species exhibited hardly sufficient differences to warrant its removal from the genus *Carteria*, but extended observation during more than a year has convinced me that it is very distinct, and that it is very desirable to maintain the genus *Platymonas* West. Wille has also recorded *Carteria subcordiformis* as a freshwater species, while in all the seven stations where I have collected it the water has been brackish; but in these small rock hollows on the shore the salinity of the water undoubtedly varies considerably. I have found that cells may be transferred successfully to fresh water or to clean sea water.—TRACY E. HAZEN.

ASTEROCOCCUS SUPERBUS (Cienk.) Scherf.—This beautiful member of the Protococcales was found in abundance in 1920 and 1921 among sphagnum along the shores of Sheep Pond, Cuttyhunk Island. This is its first recorded occurrence for North America, though Smith[1] has found *Asterococcus limneticus* in Wisconsin.

The method of escape of the spores, not hitherto noted, is indicated in fig. 26. The lamellae at a point opposite the clear spot which is the point of origin of the cilia soften and swell, finally dissolving. The outermost layer is first involved, then the others progressively until the spore is free to escape.—I. F. LEWIS.

ANABAENA SPIROIDES VAR. CRASSA LEMM.—On July 30, 1920, the writer noted a considerable "bloom" on North Head of Hummock Pond, Nantucket, Massachusetts. This on examination proved to be a mixture of *Clathrocystis aeruginosa* (Kütz) Henfr., and an *Anabaena* notable for the regularity of its spiral trichome, and for having round

[1] Smith, G. M. Phytoplankton of the inland lakes of Wisconsin. Madison. 1920.

spores. Considerable material was obtained by the kindness of Dr. Alice M. Russell, and some was sent to Dr. Gilbert M. Smith, who identified the form as *Anabaena spiroides* var. *crassa* Lemm., noting

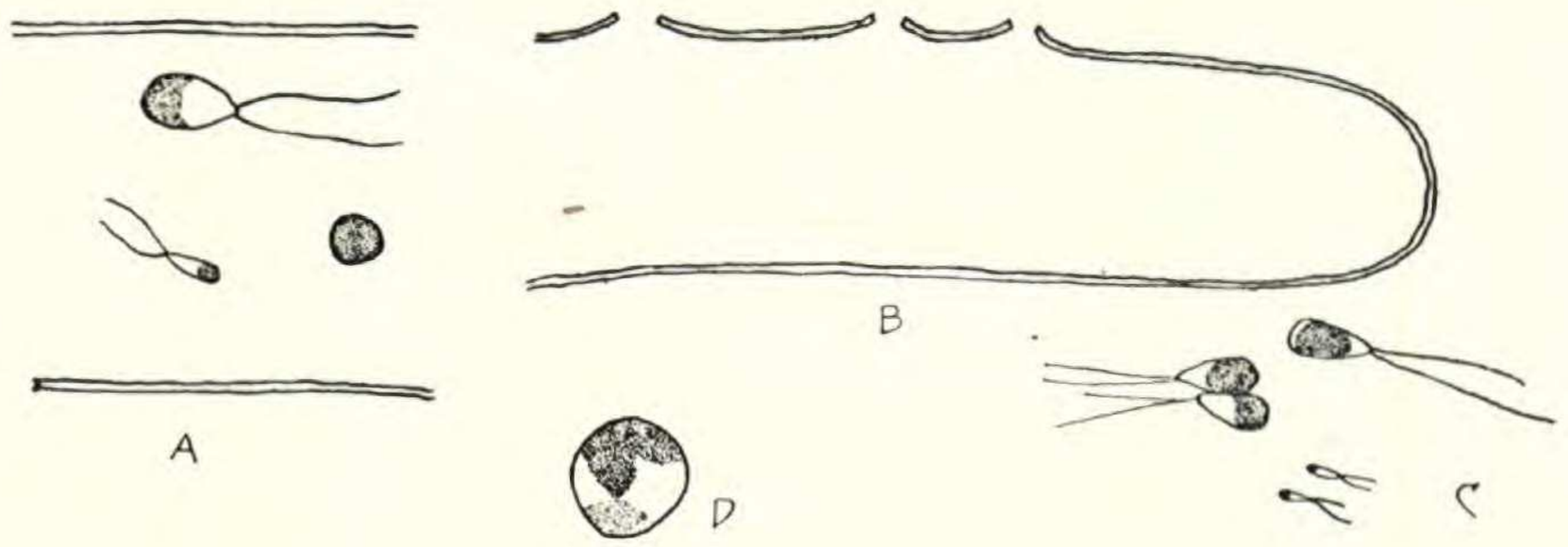

FIG. 1. *Anateana spiroides* var. *crassa*. A, Trichome showing three heterocysts but no spores. ×300. B, C, D, Portions of trichome showing spores and heterocyst. × 650.

however that the spores of the Nantucket material are round, whereas those of this variety of *Anabaena spiroides* are typically elongate. The measurements of the Nantucket form are: trichome 11.5μ average diameter, heterocysts 13μ diameter, and spores thick and smooth-walled, diameter 22μ. Dr. Smith has reported *Anabaena spiroides* var. *crassa* as occurring in Wisconsin lakes.—W. R. TAYLOR.

Mougeotia tenuis (Cleve) Wittrock. This distinct form was found with zygospores in a small pond on Pasque Island July 6, 1921.

Mougeotia parvula Hassall. Abundant material of this species in all stages of conjugation appeared in a drinking fountain in Woods Hole, July 1921.

BRYOPSIS HYPNOIDES Lamx.—In a specimen of *Bryopsis hypnoides* Lamx., collected from a float in the harbor near the laboratory, a great many of the branches were found to contain gametes. All of the protoplasm of the branch goes into the formation of the gametes, which escape through several pores in the cell walls. The passage out was moderately rapid. On the slide under the microscope, the female gametes soon settle down and become motionless, whether fertilization occurs or not. The males are more active, settling down later. Some branches contained both male and female gametes. In such cases the number of female gametes is greater. Other branches apparently produce only one kind.

The male gametes are very small and biciliate, the cilia being of equal or possibly subequal length. The chloroplast is massed in the

posterior part of the cell and is slightly orange in color, the rest of the cell being colorless. Cilia are directed forward in swimming.

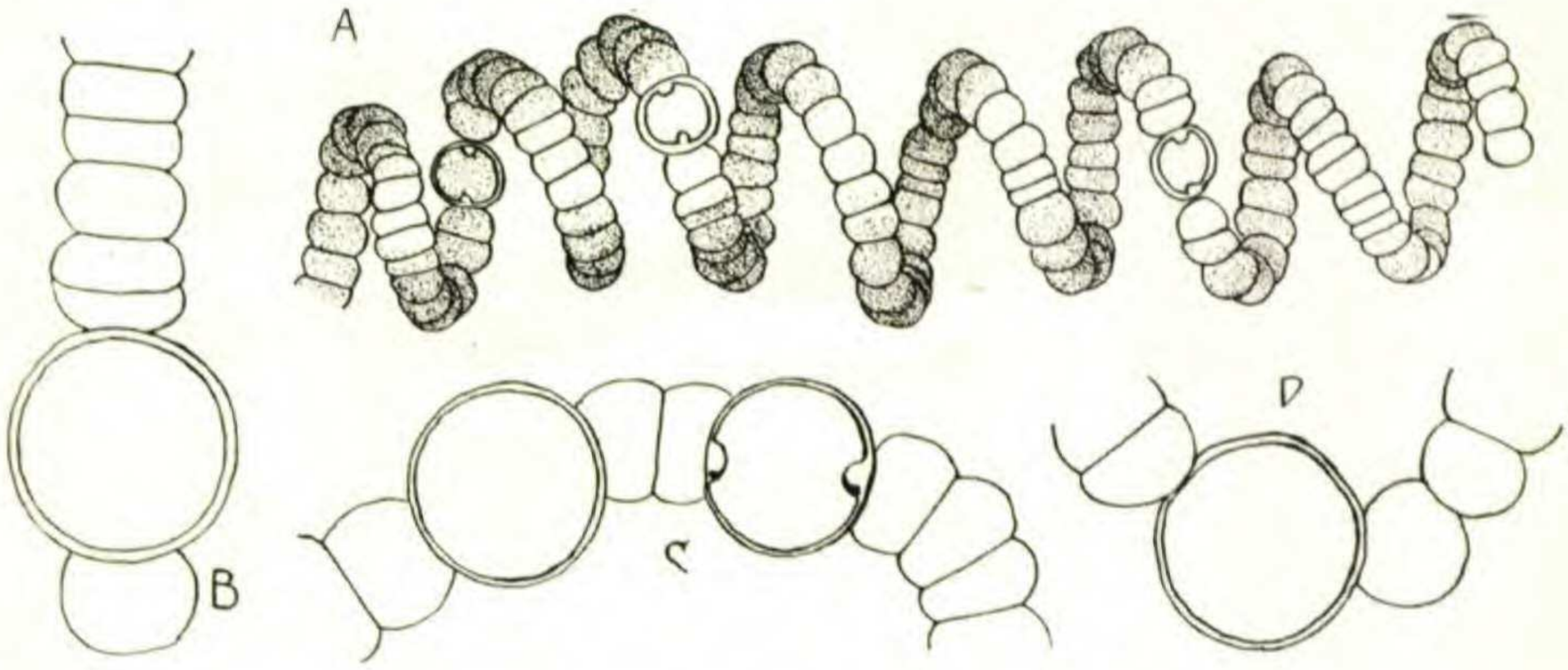

FIG. 2. *Bryopsis hypnoides*. × 650. A, Male and female gametes in portion of branch. B, Exit pores in side of branch. C. Male and female gametes. D. Germinating zygote.

The female gametes are more egg-shaped and much larger than the males. In structure they are similar save for a slight yellowish cast to the chloroplast.

On fusion the pair settle down and zygotes of irregular shape are formed, which show some metabolic movements.

The phenomena of germination were not observed except for an increase in the size of the zygote.

The Bryopsidaceae are prevailingly dioecious, so that the monoecism observed in *Bryopsis hypnoides* is exceptional in the family. The length of the cilia is also exceptional in this species. It varies from slightly longer than, to more than twice as long as, the cell.—J. B. LACKEY.

ECTOCARPUS MITCHELLAE HARV. VAR. **parva** N. VAR. Thallus caespitose, attached, 8–12 mm. tall. Interlacing decumbent basal filaments giving rise to the primary erect filaments (of 22 μ average diameter) seldom branched. The few lateral secondary branches scattered, largely on the distal half of the primary, with average diameter 16 μ at the base, and produced into short hairlike tips. Plurilocular sporangia sessile, erect on the upper side of the secondary branches, cylindrical, obtuse, composed of a few large cells each producing one round or slightly oval motionless megaspore. Sporangia average 60 μ long by 16 μ broad, and spores 12 μ in diameter.

During the last week of July, 1919, the collectors of the U. S. Fish-

eries Commission brought into the laboratory at Woods Hole, Massachusetts, a specimen of the Loggerhead Turtle, *Thalassochelys caretta* from Vineyard Sound. Tufts of an alga on the carapace were referred to the writer for study. He is much indebted to the late Mr. F. S. Collins for helpful suggestions with regard to its relationships.

The form was found to be closely related to *Ectocarpus Mitchellae* Harv. (*E. virescens* Thuret) as indicated by its sporangial characters and certain striking features of its vegetative habit. It differs mainly in having the primary erect filaments sub-simple, not abundantly branched, and in the smaller size of the vegetative filaments and the sporangia. The fresh material showed abundant stages in the development of the sporangia, the extrusion of the spores and their germination and growth. The decumbent filaments produced lobed haptera, and the cells of the erect filaments occasionally sent out corticating down-growths which sometimes reached to the substratum. The filaments and branches have a limited apical growth soon succeeded by intercalary growth from near the base. In all these growth characters it resembles *E. virescens* Thuret as described by Sauvageau (Jour. de Bot. Vol. 10, 1896). The non-motile spores showed a very distinct wall, and no evidence could be found that they had the power of movement at any time.

On July 19th, 1921, Dr. I. F. Lewis collected tufts of a brown alga from a piece of timber washed ashore on the island of Cuttyhunk, Massachusetts, which on examination proved to be the same variety as that obtained two years before. This material also showed abundant sporangia and sporelings and was in more luxuriant condition than the first lot. The fact that both collections of the alga were from drifted objects makes it impossible to tell the source of the material, but the unworn appearance of the timber would seem to indicate that it had not travelled very far and that this *Ectocarpus* might be expected along the eastern seaboard at no great distance south of Cape Cod.—W. R. Taylor.

Baptisia bracteata (Muhl.) Ell. is listed in the floras as having a western distribution, coming east only to Michigan. About the end of July 1919 one of the botanical students at the Marine Biological Laboratory brought in to the department a specimen which proved to be this plant. Investigation showed that it had appeared along the

railroad north of Woods Hole, between there and Falmouth. It seems probable that it was a quite recent introduction and the vigor of the plants and the large racemes of hairy pods seemed to point to its establishment in this neighborhood, but the present season shows none of the original colony remaining.

Search in the Herbarium of the University of Pennsylvania produced no specimen from the East, and in that of the Philadelphia Academy of Natural Sciences material from the Southern States and one specimen from Illinois were the nearest records. An inquiry at the Gray Herbarium at Harvard University brought the information that the nearest localities which they had represented were Illinois and South Carolina, and the New York Botanical Garden reported nothing from the Central Atlantic or New England States. As there seems to be no published record of this plant from New England, this locality then supported the most northeasterly colony of the species yet reported.

Specimens showing immature pods have been placed in the Herbaria of the Marine Biological Laboratory and the University of Pennsylvania.—W. R. TAYLOR.

EXPLANATION OF PLATE 133

Figs. 1-19, *Platymonas subcordiformis*. × 800.
Figs. 1–3, Vegetative cells, face view.
Fig. 4, Side view.
Figs. 5–7, Stages in cell division.
Figs. 8–17, Longitudinal and oblique divisions.
Fig. 18, Longitudinal division, end view showing lobed chloroplast.
Fig. 19, Transverse division.
Figs. 20–24, *Ectocarpus Mitchellae* var. *parva*.
Fig. 20, Spores from living material showing chromatophores. × 730.
Fig. 21, Vegetative cell from primary filament. × 730.
Fig. 22, Main filament and branch with sporangia and sporelings. ×235.
Fig. 23, Branch showing mature sporangium discharging spores, × 235.
Fig. 24, Main filament and branches with maturing sporangia. × 235.
Fig. 25, *Asterococcus superbus*, vegetative colony. × 365.
Fig. 26, *Asterococcus* zoospore, showing mode of release. × 365.